

MOSQUITO A GLOBAL THREAT: CONTROL BY HERBAL APPROACH

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ABSTRACT

Use of Herbal insecticides is a green approach towards Public health maintenance. They are a safe, efficient and user friendly way to prevent Human and mosquito interaction. These herbal insecticides in different forms can be highly effective as compared to others in field as well as for in house usage. The choice of different essential oils as a potential herbal insecticide is depending upon its disintegration capacity in air. It is also depending upon the concentration of active ingredients in the formulation. The outcome from different evaluations suggests that most of the essential oils have the potential to be used as an eco-friendly mosquito repellent as well as mosquitocidal. In relation with this aspect such type of evaluations of different types of essential oils can be studied to find out broad spectrum insecticide.

KEYWORDS: Essential Oils, Mosquitocidal, Mosquito Repellent, Eco Friendly, Insecticide

INTRODUCTION

Mosquitoes are vectors responsible for transmitting diseases such as malaria, dengue, Chikunguniya, Japanese encephalitis, and lymphatic filariasis. Anopheles are one of the species of Mosquitoes which are known vector for malaria parasites. Likewise Aedes mosquitoes are responsible for transmission of dengue, Chikunguniya. Culex mosquitoes are well known vectors for lymphatic filariasis. In 2010, about 216 million malaria cases and an estimated 655,000 malaria deaths were reported. Increased prevention and control measures have led to a decrease in malaria mortality rates by more than 25% globally since 2000 and by 33% in the WHO African Region ¹.

Present day, the control of mosquito born diseases is the major challenging task. Now a day's the insecticides used for mosquito control have different degree of effectiveness. A stipulated number of essential oils were studied in this review which can be working as good mosquito repellents in possible different formulations. Chemical mosquito repellents have a remarkable efficacy, but they may induce toxic effects to skin and nervous system. Hence it was concluded that natural mosquito repellents were preferred over chemical one ². The aim of this review was to analyze different essential oils as a mosquito repellent or mosquitocidal which may prevent mosquito and human interactions through green approach.

Herbal insect repellents have been used as a personal protection measure via green approach. Knowledge on traditional repellent plants obtained through ethno botanical studies is a valuable resource for the development of new herbal products. Recently, commercial synthetic repellent products have gained increasing popularity among consumers because of fast action, but it is not eco friendly and nor safe to all age group³. Currently there is a need to find out the herbal based mosquito repellants, their evaluations, standardization and proper marketing. Simultaneously it is important to consider the consumers safety also.

How to Control Mosquito Born Diseases

Mosquito-borne diseases affect millions of people worldwide each year. The preventive and curative measures, however, are often not enough. Each of the products used for mosquito control in different formulation manner have varying degrees of effectiveness, Because of this fact it is important to know their comparative efficacy profile⁴.

Herbal mosquito repellent formulations now days have earned a lot of attention of the researchers so as to find out an alternate solution for the Chemical mosquito repellent⁵. Mosquitoes are responsible for the different types of insect borne diseases like dengue, chikun guniya, Filariasis, Malaria etc. Apart from the global threat from Mosquitoes this there is a continuous need to find out the broad spectrum insect repellent which can take care of ticks, other flies along with Mosquitoes. So here onwards the Mosquito repellents are required to be studied to find out their repellency as well as cidal effect against other insects also⁶.

So far as the efficacy of any mosquito or insect repellent is concerned its mode of action, durability and endurance factors should be taken into consideration. Pertaining to these factors synthetic chemical repellents have upper hand amongst all. Then why there is a need to find out an alternative to chemical repellent? The answer is very simple as all the synthetic chemicals have one or the other side effect on the user⁷. Synthetic and Natural insecticides needs to be studied not only from efficacy aspect but from safety point of view of users also. The classification of mosquito repellent is Chemical and Non chemical. Chemical repellents again can be classified as Synthetic and Natural, while non-chemical method mostly focusing on biological control⁸.

DEET (N, N-dimethyl-m-toluamide) is a broad-spectrum repellent and it was patented by the U.S. Army in 1946 for use in areas with heavy biting insect infestation. Since the 1950s the synthetic chemical DEET has been the standard to which all other mosquito, tick and biting fly repellents have been compared. DEET is still the standard of comparison, but the long search for natural or organic repellents is finally yielding a number of potential alternatives, some from the plant world and others from such unlikely places as human sweat. Likewise there are many insecticidal formulations which claim to be Mosquitocidal like D-trans Allethrin, Transfluthrin etc. But the above mentioned insecticides are known to have varied type of toxic effects on users. The likely affected areas by DEET are Nervous system and Skin and the effects are like Insomnia, Allergy, and mood disturbance etc. Different age groups from human beings may show the varied degree of adverse effects of DEET⁹.

These effects can be different amongst different age group and different animals also. So to avoid these problems, formulating and standardizing the alternative Natural chemical or Herbal insect repellent is the key task^{10, 11}.

The potential of Essential oils as Herbal insect repellents or cidal was being studied with different ethno botanical formulations. There are many preparations from naturally occurring sources that are repellent to certain insects. Some of these act as insecticides while others are only repellent. For example Basil , Castor oil ,Catnip oil, Cedar oil, Celery extract, Cinnamon oil, Citronella oil, Clove oil, Eucalyptus oil, Geranium oil, Lemon eucalyptus essential oil and its active ingredient p-menthane-3,8-diol (PMD),Lemongrass oil, Neem oil, Peppermint oil ,Rosemary oil ^{12,13,14}.

Silver and gold nano particles were synthesized from the aqueous bark of the dalchini (*Cinnamomum zeylanicum*). It showed larvicidal effects for the control of mosquito life cycle¹⁵.

Silver nanoparticles have also been tested against the larvae and pupae of *Aedes aegypti*¹⁶.

CONCLUSIONS

So far as the urge of herbal insecticides usage is concern, it will be non-toxic, user friendly in comparison with chemical insecticides. The above mentioned parameters holds good if standardized, performed at lowest possible dose level, is safe for human beings.

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